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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/998,683	11/30/2001	Mark J. Halstead	EMS-02302	7367

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EXAMINER

CHACE, CHRISTIAN

ART UNIT	PAPER NUMBER
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2187

DATE MAILED: 05/06/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/998,683

Applicant(s)

HALSTEAD ET AL.

Examiner

Christian P. Chace

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 17 March 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Amendment***

This Office action has been issued in response to Amendment filed 17 March 2004. Preliminary Amendment filed 7 January 2002 has been entered as paper number 1 ½. Claims 1-19 are pending. Applicants' arguments have been carefully and respectfully considered in light of the instant amendment, but are not persuasive. Accordingly, this action has been made FINAL.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-19 are rejected under 35 U.S.C. 102(b) as being anticipated by Ofek et al (US Patent 5,889,935).

With respect to independent claim 1, a method of reversing a communication path between a first volume on a first storage device and a second volume on a second storage device is disclosed in figure 15 as using either of the volumes as a primary volume. Also, column 34, lines 60-64 recites reversing the roles of the R1 and R2 volumes, thereby reversing the communication path, as the host would then directly access the R2 volume and mirror to the R1 volume.

Suspending communication between the first and second volumes while maintaining operations for other volumes of the storage devices is disclosed in figure

15, #480 as suspending host processing with the R1 volume. If host processing is suspended with the R1 volume, then there is nothing to mirror to the R2 volume, so communication is inherently suspended to that volume as well. As #480 solely discloses suspension of operations for R1 and R2 (as discussed supra), it is implicitly anticipated that no other volumes are affected by the suspension.

Causing the first volume to change from a source volume to a destination volume without destroying the first volume and causing the second volume to change from a destination volume to a source volume without destroying the second volume is disclosed in figure 15 as using either of the volumes as a primary volume. Both volumes are merely synchronized, not destroyed. Also, column 34, lines 60-63 discuss the role reversal of the two volumes. The primary volume is the source volume, and the secondary volume is the destination volume, before reversal. Once reconfigured, the secondary volume is the source volume, as it would be directly accessed by the host, and the primary volume is the destination volume, that would be remotely mirrored to from the source volume.

Resuming communication between the first and second volumes is disclosed as discussed supra, as resuming host processing. However, figure 15 also discloses resuming processing after migration is finished. Resuming communications prior to synchronizing the volumes, wherein, in response to a data access operation to the second volume, and valid data for the access operation existing only in the first volume, the data access operation to the second volume is satisfied by accessing data from the first volume is disclosed in column 10, lines 39-47, which discusses access commands

going to the accessible device (volume) and synchronizing later when the original device becomes available again.

With respect to claims 2, 9, and 15, causing the first volume to change from a source volume to a destination volume including modifying a table of the first storage device is disclosed in column 33, line 60 into column 34, line 17, as shown in figure 14. The table is the bitmap array, and the modification of that table occurs in steps #472 and #473.

With respect to claims 3, 10, and 16, causing the second volume to change from a source volume to a destination volume including modifying a table of the second storage device is disclosed in figure 14, #476 and #477. Again, the table is the other half of the bitmap array (as opposed to the first half discussed supra with respect to claims 2, 9, and 15), and the switching and copying in those steps is the modification of that table.

With respect to claims 4, 11, and 17, suspending communication including setting the first volume to a "not ready" state is disclosed in figure 15, #480 as suspending host processing to the R1 volume. If processing is suspended, then, inherently, communication is suspended, as communication is "processing" and *vice-versa*. Also, if there is no processing there is nothing to communicate.

With respect to claims 5, 12, and 18, resuming communication including setting the second volume to a "ready" state is disclosed in column 34, lines 62-63, which discloses the host directly accessing the R2 volume, which is the secondary volume.

With respect to claims 6, 13, and 19, returning a result indicating successfully reversing the communication path is disclosed in figure 15 as processing resuming using either of the volumes as a primary volume. Accordingly, if the R2 volume is, indeed, being used as the primary volume, and processing resumes, then the communication path has inherently been successfully reversed.

With respect to independent claim 7, a method of managing volumes on storage devices is disclosed in the title as remote data mirroring.

Receiving a command requesting reversal of a communication path between a first volume on a first storage device and a second volume on a second storage device is not only inherent, as a communication path is reversed, as will be discussed below, and a computer must, inherently be commanded to do something; but it is also disclosed in figure 14 as "migrate active volume."

Suspending communication between the first and second volumes while maintaining operations for other volumes of the storage devices is disclosed in figure 15, #480 as suspending host processing with the R1 volume. If host processing is suspended with the R1 volume, then there is nothing to mirror to the R2 volume, so communication is inherently suspended to that volume as well. As #480 solely discloses suspension of operations for R1 and R2 (as discussed supra), it is implicitly anticipated that no other volumes are affected by the suspension.

Causing the first volume to change from a source volume to a destination volume without destroying the first volume and causing the second volume to change from a destination volume to a source volume without destroying the second volume is

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disclosed in figure 15 as using either of the volumes as a primary volume. Both volumes are merely synchronized, not destroyed. Also, column 34, lines 60-63 discuss the role reversal of the two volumes. The primary volume is the source volume, and the secondary volume is the destination volume, before reversal. Once reconfigured, the secondary volume is the source volume, as it would be directly accessed by the host, and the primary volume is the destination volume, that would be remotely mirrored to from the source volume.

Resuming communication between the first and second volumes is disclosed as discussed supra, as resuming host processing. However, figure 15 also discloses resuming processing after migration is finished. Resuming communications prior to synchronizing the volumes, wherein, in response to a data access operation to the second volume, and valid data for the access operation existing only in the first volume, the data access operation to the second volume is satisfied by accessing data from the first volume is disclosed in column 10, lines 39-47, which discusses access commands going to the accessible device (volume) and synchronizing later when the original device becomes available again.

With respect to claim 8, the command being a "single multihop, multiexecute" command that causes operations to be performed on the first and second storage devices is disclosed as "migrate active volume" in figure 14. Page 9, lines 21-23 of the instant specification were looked to in order to define this type of command, as examiner is unfamiliar with the terminology. From the instant citation, "The multihop/multiexecute system command is a single system command that is provided to

multiple storage devices and indicates operations to be performed by the multiple storage devices.” Accordingly, the “migrate active volume” command is a command in the (single) system that is provided to multiple storage devices (primary and secondary volumes) and indicates operations to be performed by the devices (migration).

With respect to independent claim 14, a computer program product is disclosed in column 33, lines 50-53 as a task using software.

Reversing a communication path between a first volume on a first storage device and a second volume on a second storage device is disclosed in figure 15 as using either of the volumes as a primary volume. Also, column 34, lines 60-64 recites reversing the roles of the R1 and R2 volumes, thereby reversing the communication path, as the host would then directly access the R2 volume and mirror to the R1 volume. This is the active migration referred to in column 33, line 50, which may be implemented in software. Software is, by definition, executable code. Examiner notes then, that the claims which depend from the instant claim are also anticipated as discussed supra by the active migration scheme being implanted by software, as discussed instantly.

Suspending communication between the first and second volumes while maintaining operations for other volumes of the storage devices is disclosed in figure 15, #480 as suspending host processing with the R1 volume. If host processing is suspended with the R1 volume, then there is nothing to mirror to the R2 volume, so communication is inherently suspended to that volume as well. As #480 solely



discloses suspension of operations for R1 and R2 (as discussed supra), it is implicitly anticipated that no other volumes are affected by the suspension.

Causing the first volume to change from a source volume to a destination volume without destroying the first volume and causing the second volume to change from a destination volume to a source volume without destroying the second volume is disclosed in figure 15 as using either of the volumes as a primary volume. Both volumes are merely synchronized, not destroyed. Also, column 34, lines 60-63 discuss the role reversal of the two volumes. The primary volume is the source volume, and the secondary volume is the destination volume, before reversal. Once reconfigured, the secondary volume is the source volume, as it would be directly accessed by the host, and the primary volume is the destination volume, that would be remotely mirrored to from the source volume.

Resuming communication between the first and second volumes is disclosed as discussed supra, as resuming host processing. However, figure 15 also discloses resuming processing after migration is finished. Resuming communications prior to synchronizing the volumes, wherein, in response to a data access operation to the second volume, and valid data for the access operation existing only in the first volume, the data access operation to the second volume is satisfied by accessing data from the first volume is disclosed in column 10, lines 39-47, which discusses access commands going to the accessible device (volume) and synchronizing later when the original device becomes available again.

***Response to Arguments***

With respect to applicants' argument that the instant application was amended via a preliminary amendment filed 13 December 2001 to claim priority to Provisional US Patent application 60/332,991, examiner agrees. The Preliminary Amendment has been entered as discussed supra, and examiner apologizes for any inconvenience as a result of this oversight. Accordingly, the claim to priority of the instant application to the above-referenced provisional application has been resolved.

With respect to the objections to the specification, applicants have amended the instant specification to overcome the instant rejections. Accordingly, they have been removed.

With respect to applicants' argument that Ofek et al do not teach the newly recited claim limitations of the instant amendment, examiner respectfully disagrees, and refers applicants to the rejection detailed supra. Specifically, resuming communications prior to synchronizing the volumes, wherein, in response to a data access operation to the second volume, and valid data for the access operation existing only in the first volume, the data access operation to the second volume is satisfied by accessing data from the first volume is disclosed in column 10, lines 39-47, which discusses access commands going to the accessible device (volume) and synchronizing later when the original device becomes available again. Accordingly, examiner has maintained the rejection, and this Office action has been made FINAL.

***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christian P. Chace whose telephone number is 703.306.5903. The examiner can normally be reached on 9-4-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Donald Sparks can be reached on 703.308.1756. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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DS/cpc



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